

# Claims

- [c1] A method of applying paste to an electronic circuit board substrate comprising:
- providing an electronic circuit board substrate;
  - providing over the substrate a mask having openings therein;
  - providing a roller having an axis and a surface adjacent the roller;
  - applying paste to the mask or a side of the surface facing the mask; and
  - rolling the roller and the surface over the mask and flowing the paste into the openings in the mask without substantially sliding the roller and surface over the mask.
- [c2] A method of applying paste to an electronic circuit board substrate comprising:
- providing an electronic circuit board substrate;
  - providing over the substrate a mask having openings therein;
  - providing a roller having an axis and a surface adjacent the roller;
  - applying paste to a side of the surface facing the mask;
  - and

rolling the roller and the surface containing the paste over the mask and flowing the paste into the openings in the mask without substantially sliding the roller and surface over the mask.

- [c3] The method of claim 2 wherein the surface is on a film strip, separate from the roller, disposed between the roller and the substrate.
- [c4] The method of claim 2 wherein the paste is applied in a bead across the surface, parallel to the roller axis.
- [c5] The method of claim 2 wherein the paste is applied in a continuous bead across the surface, parallel to the roller axis.
- [c6] The method of claim 2 wherein the paste is applied in a discontinuous bead across the surface, parallel to the roller axis.
- [c7] The method of claim 2 wherein the paste is applied in a bead across the surface, parallel to the roller axis, at a variable rate of speed.
- [c8] The method of claim 2 wherein the paste is applied in a film on the surface.
- [c9] The method of claim 2 wherein the paste is applied selectively to the surface, conforming to areas of the mask

openings.

- [c10] The method of claim 2 wherein the surface is attached to the roller.
- [c11] The method of claim 2 wherein the surface does not substantially absorb components of the paste.
- [c12] The method of claim 2 wherein the substrate contains openings for vias, and wherein the overlying mask contains openings for lines and openings corresponding to the substrate via openings, and wherein the paste is flowed into the mask, onto portions of the substrate below the mask line openings and into substrate via openings during the rolling of the roller and the surface containing the paste.
- [c13] The method of claim 2 wherein the substrate is selected from the group consisting of organic, ceramic and metal printed circuit board substrates.
- [c14] The method of claim 2 wherein velocity of the roller is varied to compensate for variations in bow wave volume or shear thinning of the paste.
- [c15] A method of applying a conductive paste to an electronic circuit board substrate comprising:  
providing an electronic circuit board substrate;

providing over the substrate a mask having openings therein;  
providing a roller having an axis;  
providing a film between the roller and the mask;  
applying conductive paste to a side of the film facing the mask; and  
rolling the roller over the substrate while applying pressure to the film containing the conductive paste and flowing the paste into the openings in the mask and onto the substrate without substantially sliding the roller and film over the mask.

- [c16] The method of claim 15 wherein the paste is applied in a continuous bead across the film, parallel to the roller axis.
- [c17] The method of claim 15 wherein the paste is applied in a discontinuous bead across the film, parallel to the roller axis.
- [c18] The method of claim 15 wherein the paste is applied in a bead across the surface, parallel to the roller axis, at a variable rate of speed.
- [c19] The method of claim 15 wherein the film is in the form of a strip, and including providing a spool for the film strip, and feeding the film strip between the roller and

the mask after paste is applied thereto.

- [c20] An apparatus for applying paste to an electronic circuit board substrate comprising:
- a mask for an electronic circuit board substrate, the mask having discrete openings therein for forming structures on the substrate;
  - a roller having an axis and a surface adjacent the roller and the mask;
  - a paste applicator for applying paste to a side of the surface facing the mask;
  - the roller and the surface containing the paste being adapted to roll over the mask and flow the paste into the openings in the mask and on to the substrate without substantially sliding the roller and surface over the mask.
- [c21] The apparatus of claim 20 wherein the surface is on a film strip and further including at least one spool for feeding the film strip between the roller and the mask after paste is applied thereto.
- [c22] The apparatus of claim 21 wherein the surface is made of a plastic that does not substantially absorb components of the paste, while having sufficient friction to substantially prevent slippage of the roller during rolling over the mask and flowing of the paste into the mask openings.

- [c23] An article comprising a flexible film strip having at least a portion uniformly covered on one surface thereof with a paste for application to a an electronic circuit board substrate.
- [c24] A method of applying paste to an electronic circuit board substrate comprising:  
providing an electronic circuit board substrate;  
providing over the substrate a mask having openings therein for forming structures on or in the substrate;  
providing a roller;  
providing a film strip having on a surface thereof a layer of paste to be applied to the substrate;  
passing the film strip between the roller and the mask, with the film strip surface containing the paste facing the mask; and  
applying force to the roller against the film strip and mask, while moving the roller along the mask without substantially sliding the roller and film strip surface over the mask, to flow the paste into the openings in the mask and on to the substrate.
- [c25] An apparatus for applying paste to openings in an electronic circuit board substrate comprising:  
a mask for an electronic circuit board substrate, the mask having discrete openings therein for forming

structures on the substrate;

a film strip having on a surface thereof, facing the mask,

a layer of paste to be applied to the mask and substrate;

and

a roller, adjacent the mask, adapted to roll against the

film strip and mask, without substantially sliding the

roller and film surface over the mask, and flow the paste

into the openings in the mask and on to the substrate.